

University of Montana

ScholarWorks at University of Montana

Public and Community Health Sciences Faculty
Publications

Public and Community Health Sciences

4-2010

Strategies to Recruit and Retain College Smokers in Cessation Trials

M. Meghan Davidson
University of Nebraska-Lincoln

Nikole J. Cronk
University of Montana - Missoula

Kari J. Harris
University of Montana - Missoula, kari.harris@umontana.edu

Solomon W. Harrar
University of Montana - Missoula

Delwyn Catley
University of Missouri - Kansas City

See next page for additional authors

Follow this and additional works at: https://scholarworks.umt.edu/pchs_pubs



Part of the [Public Health Commons](#)

Let us know how access to this document benefits you.

Recommended Citation

Davidson, M. Meghan; Cronk, Nikole J.; Harris, Kari J.; Harrar, Solomon W.; Catley, Delwyn; and Good, Glenn E., "Strategies to Recruit and Retain College Smokers in Cessation Trials" (2010). *Public and Community Health Sciences Faculty Publications*. 39.
https://scholarworks.umt.edu/pchs_pubs/39

This Article is brought to you for free and open access by the Public and Community Health Sciences at ScholarWorks at University of Montana. It has been accepted for inclusion in Public and Community Health Sciences Faculty Publications by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.

Authors

M. Meghan Davidson, Nikole J. Cronk, Kari J. Harris, Solomon W. Harrar, Delwyn Catley, and Glenn E. Good

Published in final edited form as:

Res Nurs Health. 2010 April ; 33(2): 144–155. doi:10.1002/nur.20372.

Strategies to Recruit and Retain College Smokers in Cessation Trials

M. Meghan Davidson, Ph.D.[Assistant Professor],
The University of Nebraska – Lincoln

Nikole J. Cronk, Ph.D.[Adjunct Assistant Professor],
The University of Missouri – Columbia

Kari Jo Harris, Ph.D., M.P.H.[Associate Professor],
The University of Montana

Solomon Harrar, Ph.D.[Associate Professor],
The University of Montana

Delwyn Catley, Ph.D.[Associate Professor], and
The University of Missouri – Kansas City

Glenn E. Good, Ph.D.[Professor]
The University of Missouri – Columbia

Abstract

Techniques to recruit and retain college fraternity and sorority members who reported past 30-day smoking into a cessation trial are described. Recruitment efforts included relationship-building, raffles, and screening survey administration during existing meetings. Surveys were administered to 76% ($n = 3,276$) of members in 30 chapters, 79% of eligible members agreed to participate, and 76% of those completed assessments and were enrolled in the trial ($n = 452$). The retention rate was 73%. Retention efforts included cash incentives, flexible scheduling, multiple reminders, chapter incentives, and use of chapter members as study personnel. Retention was not related to demographic, behavioral, or group characteristics. The strategies of partnership, convenience, and flexibility appear effective and may prove useful to investigators recruiting similar samples.

Keywords

recruitment; retention; clinical trial; college; smoking cessation

Successful recruitment and retention of participants, regardless of the focus of the study, are critically important to an investigation's validity, generalizeability, and power to detect the effectiveness of the intervention under investigation (Given, Keilman, Collins, & Given, 1990; Northouse et al., 2006; Villarruel, Jemmott, Jemmott, & Eakin, 2006). Recruitment is one of the most challenging tasks for investigators conducting clinical trials (Harris et al., 2003; Ivaz et al., 2006; Villarruel et al.). Others have cited recruitment and retention of study participants as major concerns for any health-related research examining outcomes of treatment (Hough, Tarke, Renker, Shields, & Glatstein, 1996). Swanson and Ward (1995) summarized problems in recruitment and retention including study complexity, treatment

provider attitudes, competing trials, and a variety of issues related to potential participants. Yet, Northouse et al. asserted that a cursory review of the literature clearly demonstrates a lack of published information regarding strategies utilized to improve study recruitment and retention. Although Northouse et al. were discussing interventions with cancer patients, this dearth of recruitment and retention strategies exists across a wide variety of populations. We report here an examination of recruitment and retention strategies employed during a clinical trial of a counseling intervention to increase smoking cessation among college students.

Identified Problems in Recruitment

Successful recruitment affects the power to detect an intervention's effectiveness. It is no surprise that recruitment and retention represent a significant amount of effort and financial cost associated with clinical trials (Motzer, Moseley, & Lewis, 1997; Sears et al., 2003; Villarruel et al., 2006). Because of their stage in life and attitudes about health, recruiting college students and smokers to health programs has been particularly challenging (Bost, 2005; Davies et al., 2000).

Recruiting college students

There are few publications on recruitment barriers specific to college student populations. However, Bost (2005) examined college students who declined to enroll in a free health program at their college and described the following reasons provided for not participating: (a) time constraints ("too busy"), (b) lack of communication about the program, (c) perception of not needing the program, and (d) commuters not wanting to come back to campus to participate. These explanations may be considered relevant to difficulties in recruiting college students to a clinical trial of a smoking cessation intervention as well. For example, Davies and colleagues (2000) found that substance use was the most frequently reported health concern among male college students, however, need for independence, lack of time, and not feeling a need for programs prevented most from seeking substance abuse services. College students' perceptions of health promotion programs as not relevant to them is particularly challenging for trials that require multiple assessment and/or intervention points.

Recruiting smokers

The recruitment of smokers into cessation trials can be particularly challenging. For example, in a recruitment study of college student smokers, An and colleagues (2007) found that only 32% of eligible smokers enrolled in a randomized trial of an online cessation intervention. Similarly, in a review of 33 studies involving recruitment to smoking cessation programs, McDonald (1999) found that community-based cessation programs demonstrated a median recruitment rate of 2%, with few studies successfully recruiting over 10% of eligible smokers. There is little published information on recruitment strategies for non-daily smokers because these groups are often excluded from smoking cessation trials (Okuyemi et al., 2007). This is a relevant gap for a study of college students, many of whom are characterized by non-daily or social smoking (Waters, Harris, Hall, Nazir, & Waigandt, 2006) and who do not consider themselves smokers (Levinson et al., 2007).

Retention Issues Involved in Clinical Trials

Participant retention is crucial to determining the effectiveness of the intervention being assessed and is also one of the most challenging aspects of any clinical trial. To the extent that participants drop out or are otherwise not included in outcome analyses, the effectiveness of the intervention cannot be adequately evaluated. This is especially problematic when the attrition is related to the main outcome variable and/or when attrition is not random. Data that are missing due to treatment assignment (such as treatment or

control group) or to other variables of particular interest in the study (such as initial levels of the behavior of interest, motivation to change, gender, and age) pose problems in interpreting the meaning of findings and limit possible imputation strategies (Graham, Hofer, Donaldson, MacKinnon, & Schafer, 1997).

Smoking cessation trials

In the case of smoking cessation trials, those who fail to complete treatment or study assessments may do so because they have not quit smoking. One common method for handling such missing data in smoking cessation trials is to conduct intention-to-treat analyses, whereby those lost to follow-up are treated as smokers in the analyses (Hall et al., 2001). If large numbers of individuals do not receive the intervention or otherwise fail to provide outcome data, the treatment is likely to be deemed ineffective or results may be inconclusive, whether or not it is actually so. Several factors can influence retention levels in trials including the behavior being targeted by the intervention, the nature of the intervention being tested, and characteristics of the target population. Clinical trials to evaluate the effectiveness of treatments for cigarette smoking present a specific set of challenges for retention because tobacco is highly addictive.

College students

College students comprise one of the most frequently studied populations in behavioral and psychological research. Traditional college students are between the ages of 17-23, a period which some theorists describe as a distinct stage of development known as emerging adulthood (Arnett, 2000). The newly found independence experienced by college students provides many with novel opportunities to experiment with psychoactive substances such as alcohol, tobacco and illicit drugs. More than 50% of college students report beginning or substantially increasing smoking behavior in college (Harris et al., 2002; Wetter et al., 2004). Nevertheless, Nath Simmons and Brandon (2007) noted that there is a paucity of intervention research targeting college student smokers.

Whereas the independence and tendency to engage in smoking behavior makes college students a desirable population for smoking cessation interventions, characteristics of this group make retaining them in clinical trials particularly difficult. First, traditional college students are frequently in late adolescence and exhibit a high need for autonomy. Thus, they place great value on making decisions for themselves and may experience a clinical trial with multiple intervention points as restrictive or otherwise an infringement on their freedom (Kealy et al., 2007). Second, a lack of impulse control, difficulty with delayed gratification, and susceptibility to peer influence are developmental hallmarks of adolescence (Steinberg, 2007). As a result, college students are potentially less likely than older adults to resist the impulse to engage in this harmful behavior, particularly if their peers are also engaging in smoking. Consequently, retention of these students in a smoking cessation trial may be particularly difficult. Third, the nature of college students' schedules is more varied and less predictable than their same-age peers who have joined the workforce. With course schedules and extracurricular activities that change multiple times each year, it can be challenging for students to commit to participation in a clinical trial involving multiple contact points.

The purpose of the current study was to describe strategies employed to maximize recruitment and retention of participants in a clinical trial of a counseling-based intervention, using Motivational Interviewing (MI; Miller & Rollnick, 2002), designed to increase smoking cessation among college smokers. The control condition consisted of similarly-delivered MI focused on increasing students' consumption of fruits and vegetables. Recruitment rates for the four phases of recruitment are examined and retention rates are

presented for all study contact points. The purpose of this study was to determine if participant-related and study-related variables were differentially associated with participant retention rates. Selected variables included the following: gender, age, initial level of smoking, initial level of fruit and vegetable consumption, motivation to change (i.e., quit smoking or increase fruit and vegetable consumption), treatment condition, and Health Consultant assigned.

Method

Participants

Participants in this study were members of Greek fraternities and sororities enrolled at a large Midwestern university, and data were collected 2006 through 2009. In order to be eligible to participate, at the initial screening assessment participants had to be at least 18 years of age, enrolled as a student at the university where the study took place, and report both smoking at least one cigarette and no use of medication to assist in a quit attempt in the past 30 days. See Table 1 for additional participant characteristics.

Recruitment Phases

The appropriate university Institutional Review Board (IRB) approval was secured prior to any contact with human subjects, including all phases of recruitment. The clinical trial involved testing a four-session, MI counseling intervention for smoking cessation. Participants were recruited from college fraternity and sorority chapters regardless of their interest in quitting smoking. Recruitment involved four phases. First, out of 41 fraternity and sorority chapters from a large Midwestern university, the 30 chapters with the larger memberships were invited to participate. Second, within these invited chapters, individuals were recruited to participate in an initial, 5-minute, 8-item screening survey (i.e., Screener).

Third, individuals members of these 30 chapters who met the inclusion criteria based on the Screener and were interested in participating in the study were recruited to participate in a more extensive (30- to 45-minute) computerized baseline assessment approximately 1-4 days following the Screener. An upper limit of 30 members to be enrolled in the study was imposed on each chapter in an effort to increase homogeneity of cluster size within the trial. Fourth, eligible individuals who completed the baseline assessment were recruited for enrollment in the clinical trial. Phases two through four were conducted during the fall academic semester in each of three successive years, due to the high volume of participants relative to the number of available interventionists in any given semester.

Intervention Phases

Once enrolled in the trial, participants were randomized at the chapter level into either the treatment or comparison arm of the study. The intervention in each arm consisted of four individual sessions of MI targeting either smoking cessation (Treatment) or fruit and vegetable consumption (Comparison). These sessions were conducted approximately every other week following the baseline assessment. MI is a behavioral intervention originally developed by Miller and Rollnick (2002) for the treatment of addictions. It is a client-centered, non-confrontational, directive approach to treatment designed to help individuals resolve ambivalence and enhance motivation to change. The intervention sessions were delivered one-on-one by 23 master's and doctoral clinical or counseling psychology students, referred to as Health Consultants, under the supervision of doctoral-level psychologists. These Health Consultants had received content training in smoking, nutrition, diet, and the conduct of MI by respective experts in these fields, and all demonstrated proficiency in intervention fidelity rating scales prior to working with study participants.

Supervision was conducted on a weekly basis in order to ensure fidelity to the intervention protocol (Catley et al, 2006).

Six months following randomization to treatment or comparison condition all participants completed a second 30- to 45-minute, computerized, follow-up survey and provided a saliva sample. Participants were informed that the saliva sample would be tested for a biomarker of nicotine (cotinine) to confirm self-reported smoking status and encourage accurate self-reporting.

Recruitment and Retention Strategies

Utilizing Greek chapters—Using students in Greek communities, fraternities and sororities, was a primary partnership strategy employed to enhance recruitment. Greek communities are an important and often sizeable subpopulation on college campuses, and at the study site comprised 24% of enrolled students. This percentage is comparable to national data collected by The Center for the Study of the College Fraternity (2006). The highly organized social system of the Greek community provided a unique opportunity to engage college smokers in a clinical trial. Additionally, Greek students are particularly appropriate targets for smoking cessation studies, as recent findings have demonstrated that Greek members smoke at higher rates than non-Greeks (McCabe et al., 2005; Morrell, Cohen, Bacchi, & West, 2005). At the campus where the study took place the 30-day smoking rate among Greek students was 44.4% at the time the study began (Harris, 2002).

Relationship building—The first phase of recruitment involved obtaining agreement from eligible Greek organizations to participate in the study via building relationships with the Greek community. This strategy stems from previous research regarding community engagement and urgings to partner with the community and population of interest to positively affect recruitment, retention, and satisfaction of participants (Centers for Disease Control and Prevention, 1997; O'Fallon, & Deary, 2002; Sapienza, Corbie-Smith, Keim, & Fleischman, 2007). This process began 5 years prior to the commencement of the current clinical trial in order to provide information about the study to the population and to gain insight into the nature of the target population. Project personnel met with members of the Greek community approximately twice per year, with initial focus on exploring ways to enhance perceived benefits of involvement and subsequent focus on maintenance of ongoing communication and relationship enhancement. Additionally, information regarding involvement of the Greek community as a whole as well as individual fraternity and sorority participation was provided. Although the clinical trial was not designed such that a cost analysis of personnel time can be performed, the recruitment and retention methods used required staff time years prior to the initiation of the study as well as throughout its duration.

Study Liaisons—In addition to relationship building, another recruitment strategy involved hiring a chapter member from each selected fraternity and sorority to work as a Study Liaison. This idea came directly from information provided by members of the Greek community. The members of each chapter participate in a plethora of campus activities; for all of these events, chapters elect a liaison to the organizing committee of the respective activity. Thus, project personnel capitalized on the Greek system's internal organizing structure by creating Study Liaison positions (see Varvel, Cronk, Harris, & Scott, in press). The role of the Study Liaison was to: (a) inform members about and enhance interest in the study, (b) answer questions members may have regarding the investigation, (c) encourage members to participate, and (d) communicate with project personnel regarding recruitment and retention issues in his/her chapter. Study Liaisons were paid \$250 for their assistance, with the opportunity to earn up to an additional \$150, based on participation rates at the 6-month follow-up of at least 85% of total members enrolled in the study within their chapters.

Convenient times and locations for assessment—Project personnel worked with individual fraternity and sorority chapter presidents to coordinate a time to attend each chapter's regularly scheduled weekly meeting held at their respective chapter houses to administer the Screening assessment. The recruitment strategy used a meeting that potential participants already had scheduled in a location convenient to them, rather than finding a new time and location strictly to meet with project personnel. This approach was developed to minimize burden on potential participants and maximize participation in screening. Additionally, one of the first tasks of Study Liaisons was to assist in getting their respective chapter members to attend this meeting so that they could participate in the screening.

Incentives—Incentives were used to increase both recruitment and retention of participants, and to reimburse participants for their time related to completing study assessments. Scholars have viewed incentives as necessary aspects of clinical trial recruitment (Dunn & Gordon, 2005) and appropriate payment to healthy participants (Lemmens & Elliott, 2001; Wilkinson & Moore, 1999). The incentives employed in this study were not viewed by project personnel or the IRB as coercive; similar to much medical research, incentives were employed to induce participants to do something beneficial (Grant & Sugarman, 2004) and to compensate them for spending time completing study assessments. Additionally, concerns regarding individuals overlooking potential risks of participating because of being compensated were alleviated due to the negligible risk level involved in the clinical trial protocol (Grady, 2005).

Individual incentives were employed during the second through fourth phases of recruitment. During the second phase, in addition to the assistance of the Study Liaisons, non-monetary items such as cookies were provided during administration of the Screener (approximately a \$15 value per chapter or \$0.13 per person screened) and raffles for iPods were held immediately following the screening assessment (one iPod Nano, a \$150 value, or \$3.75 per person). In the third phase of recruitment, a small cash incentive was provided (\$5) as well as free pizza for completing the computerized baseline assessment (approximately an additional \$3.60 per person). Potential participants also were informed that if they enrolled in the trial, they would receive small cash compensations at each assessment point for completing brief surveys (total of \$35) and a 6-month follow-up assessment (\$25) at which time pizza again was provided (approximately \$1.40 per individual enrolled in the study). Over the course of the study, the approximate total cost of these incentives per individual enrolled was \$75.

Additionally, Study Liaisons and potential participants were informed that retention rates of at least 85% within each chapter at the end of the trial and at the 6-month follow-up would result in chapter-based incentives. These incentives took the form of either vouchers for bus transportation or a donation to be used for social events, philanthropic donations, or other purposes (valued at \$500 per chapter). The incentives were chosen after consultation with members of the Greek community during the relationship-building phase described previously.

Flexibility of scheduling and communication—In order to increase success rates in the third and fourth phases of recruitment (i.e., completion of the baseline assessment and enrollment into the trial), participants were offered a wide variety of options for completing assessments. In addition to times set aside in a computer lab, the research staff arranged for portable laptop computers to be available for participants at a time and place convenient to them. Participants were contacted prior to their appointments via an automated e-mail reminder system and personal phone calls to alert them to upcoming appointments as well as missed appointments. Participants were allowed to reschedule as many times as needed.

Measures

Screening—During the in-house Screening, participants provided demographic information including gender, age, university enrollment status, Greek chapter affiliation, and contact information, and also responded to items regarding past 30-day fruit and vegetable consumption, past 30-day tobacco smoking, past 30-day use of smoking cessation pharmacotherapy, and interest in participating in the study. Project personnel including primary investigators, Health Consultants, and other staff administered the screening assessment.

Baseline assessment—At the baseline assessment, participants reported the number of cigarettes smoked as well as the number of fruit and vegetables eaten during the past 30 days using the Timeline Followback (TLFB) method (Sobell, Sobell, Klajner, Pavan, & Basian, 1986; Harris et al., 2009) as well as the number of fruits and vegetables eaten in the past 30 days described elsewhere (Harris et al.). Smoking status was not confirmed using cotinine saliva samples at this time as few people misrepresent their smoking status at study enrollment; thus, it is not standard practice to biochemically confirm at the initiation of cessation trials (SRNT Subcommittee on Biochemical Verification, 2002). Motivation to quit smoking and to increase fruit and vegetable consumption was assessed by asking participants to report how motivated they were on a scale from 0 (*not at all motivated*) to 10 (*extremely motivated*; Miller & Rollnick, 2002). A wide variety of other behavioral, motivational, and psychological measures were administered at each of the intervention sessions as well as during the 6-month follow-up assessment; however, these measures are not germane to the current manuscript and are thus not included here. Project personnel including primary investigators, Health Consultants, and other staff administered the baseline and follow-up assessments. Health Consultants administered brief measures at each of the intervention sessions, and these took participants approximately 3 minutes to complete.

Retention

Four sessions of MI were chosen based on prior research indicating that maximum benefits peak at 4-8 sessions with approximately 90 minutes of contact (Fiore, Jaen, & Baker, 2008). Because each session lasted approximately 30 minutes, three sessions provided 90 minutes of contact time. For the purposes of the retention analyses, retention was treated as a dichotomous variable; individuals completing three or more of the maximum four sessions were considered retained, and individuals completing two or fewer sessions were considered not retained.

Statistical Analyses

Baseline characteristics assessed are shown in Table 1. Due to low cell frequencies, age was collapsed into four levels (18, 19, 20, 21+) and baseline fruit and vegetable consumption was collapsed into three levels (0-1, 2-4, 5+ average servings per day).

To determine whether each of the six participant characteristic variables (gender, age, average daily fruit and vegetable consumption, past 30-day smoking, motivation to quit smoking, and motivation to increase fruit and vegetable consumption) as well as two study variables (study condition assignment and Health Consultant assigned) predicted retention, a random intercept logistic regression was fit using the GLIMMIX procedure of the SAS program (SAS Institute, 2006). The random intercept at the chapter level was introduced to account for the effect of clustering within chapters. Fit statistics and Type III Tests of Fixed Effects were evaluated to assess whether the effect of clustering data had been properly modeled and if any of the variables could significantly explain retention status.

Results

The sample of 452 participants was 95% White, compared to 90% in the university population where the study was conducted. Half of the chapters were assigned to each of the study conditions, resulting in approximately half of individual participants in each condition. There was wide variability in the number of cigarettes smoked during the past 30 days (see Table 1). At baseline, participants reported being moderately motivated to increase their consumption of fruits and vegetables and somewhat less motivated to quit smoking. Table 1 includes a full description of these and other baseline sample characteristics.

Recruitment Rates at Each Phase

Recruitment rates at each of the four phases were high. In the first phase of recruitment, all 30 of the eligible chapters agreed to participate. During the second phase of recruitment, 3,276 (76%) out of an estimated possible 4,300 members enrolled in the 30 chapters successfully completed the screening instrument. Across chapters, recruitment rates ranged from 57% to 92%. Although it is not known precisely how many of the total chapter members were in attendance at the screening sessions, as some may have opted not to complete the survey, attendance was likely less than the total chapter enrollment. Consequently, the percentage of individuals who completed the Screener of those who were asked is likely higher than the 76%. Of the 3,276 individuals screened, 2,515 did *not* meet eligibility criteria. An additional 16 individuals met eligibility criteria but were not invited to participate in the study because the upper limit of participants from their particular chapter had already been reached.

In the third phase of recruitment, of the 745 individuals who were successfully screened, deemed eligible, and invited to participate, 592 (79%) agreed to participate and were scheduled to complete the computerized baseline assessment. In the fourth and final phase of recruitment, of the 592 individuals who were eligible and agreed to participate, 124 did *not* complete the baseline assessment, and an additional 16 individuals did not pass validity checks (i.e., items created to assess participants' random responding: "I am reading each item carefully" and "Please select response choice 2 for this item") leaving 452 (76%) who successfully completed the baseline assessment and were enrolled in the trial.

Retention Statistics

Retention rates, displayed in Table 2, were similar across conditions of the study. A very high proportion of participants (89%) completed at least one session (90% treatment; 87% comparison). The majority (73%) were retained, completing three or more sessions (75% treatment; 70% comparison), and over half completed the maximum four sessions (63% treatment; 61% comparison). At the follow-up assessment occurring 6 months after the baseline assessment, 79% of participants ($n = 357$) were retained (80% treatment; 78% comparison).

Retention variability results—The generalized chi-square to degrees of freedom ratio was .98, indicating that the clustering effect was properly modeled, and that there was no overdispersion in the residuals. Results from Type III Tests of Fixed Effects (Table 3) show all p -values greater than .2, indicating no evidence that participant or study characteristics were significantly associated with retention.

Discussion

The results indicate high rates of recruitment and retention of college student participants into this clinical trial for smoking cessation. None of the participant or study characteristics

examined (i.e., gender, age, level of smoking, level of fruit and vegetable intake, motivation to quit smoking, motivation to increase consumption, treatment condition, and assigned Health Consultant) significantly predicted retention. The lack of a significant relationship between motivation to quit smoking and retention may be due to somewhat limited variability (with response range of 1-10, $M = 5.46$, $SD = 2.93$) in motivation to quit smoking among participants. Perhaps other variables not studied here, such as lack of interest, belief that these issues are not a current concern, lack of time, number of prior quit attempts, and other health-related variables, affect recruitment and retention to a greater degree. It is important to note that the recruitment and retention strategies employed were not directly tested, as that was not the aim of the larger clinical trial in which these strategies were used. Nevertheless, they did not affect participants differentially and did appear to yield positive recruitment and retention results.

The results of the current examination are either more favorable or at least comparable to findings of other studies involving this same population and trial focus. For example, Nath Simmons and Brandon (2007) conducted a single-session smoking cessation intervention for college students and were able to schedule only 54% (287 of 529) of the eligible participants for the enrollment and single-session intervention appointment. This is significantly lower than the current investigation's recruitment rate of 79%. Prokhorov and colleagues (2008) also conducted an MI-based, group-randomized smoking cessation intervention with community college students. Although their study differed from the current investigation in a number of ways (community college population, smokers defined by smoking at least one cigarette per day, and computer-assisted intervention), they found similar recruitment and retention rates, citing a recruitment rate of 80% to the baseline assessment (i.e., enrollment) and a retention rate of 77% who completed the intervention. Other researchers (e.g., Klatt et al., 2008) of college students and clinical trials for smoking cessation did not provide sufficient information regarding recruitment and retention data to compare to the results of the current investigation.

As with most approaches to recruitment, there are advantages and disadvantages associated with recruiting an intact social group (e.g., Greek chapters and their respective members) to participate in a clinical trial. The strategies we used include building relationships with more than two dozen student leaders each year. Because there is expected turnover in student leadership (and students graduate), maintaining these positive relationships was an on-going and time-consuming process. Without the cooperation of the social groups and their members the study would have been at a high risk of failure, with very few (if any) recruitment alternatives that would maintain the integrity of the study's group randomized design. Thus, collaborating with social groups for recruitment can be somewhat risky because there are few ways to salvage the study if the planned approach is unsuccessful. Furthermore, these recruitment and retention strategies may not generalize well to populations that are not as amenable to supporting their organization's goals as were these Greek chapters.

Although potentially risky, recruiting existing groups and their members provides investigators with the opportunity to capture a large pool of potential participants. Recruiting intact social groups also may be necessary when testing environmental manipulations (such as the placement of smoking receptacles) or policy-based interventions. This approach is also particularly suited for studies of individuals who have very little, if any, initial interest in changing the targeted behavior, such as in the trial described here.

Specifically, spending time getting invested in the community and making the intervention rewarding to the specific population (e.g., bus vouchers, cash, technology) rather than employing general or arbitrary incentives likely contributed to successful recruitment and

retention. These relationships produced greater knowledge of the study population that resulted in the employment of both individual and group-based incentives linked directly to participation in the trial. Participants were able to earn rewards not only for themselves, but for their social groups as well, thereby increasing the likelihood of maintaining participation in the trial. The relationship building and use of chapter members as liaisons were also important as they may have made members of the Greek community feel invested in the research process and outcome.

General Recruitment and Retention Strategies

One of the main aims of this paper was to provide general principles and strategies for recruitment to and retention of participants in clinical trials in an effort to assist other investigators working with similarly challenging populations (e.g., smokers, cancer patients, obese individuals, diabetes patients, HIV/AIDS patients). Despite a plethora of behavioral and medical focused interventions in the literature, the dearth of information regarding recruitment and retention strategies persists, and this paper begins to fill that gap.

Although the specific strategies (e.g., Study Liaisons, individual and group incentives, reminders) used in the current study may not be amenable to other investigations, the principles underlying them can be widely applied. Similar to that of Sapienza and colleagues (2007) who used a community engagement approach for their research to focus specifically on developing familiarity with the community, building relationships, and cultivating trust, the overarching principle of the current study was one of partnership and collaboration. Study personnel got closely acquainted with members of the community by becoming partners with the population of interest and this allowed us, as researchers, to garner their trust. It also permitted us to join the respective systems already existing within that population and thereby develop recruitment and retention strategies relevant to them. This type of relationship building can be applied by project personnel working in many types of research.

Convenience, flexibility, and reminders are three more principles of the current investigation that appear to have contributed to recruitment and retention success, and these essential strategies are generalizable to other studies. For this specific population, meeting participants at convenient campus locations (i.e., campus buildings, sorority/fraternity chapter houses, student union) and having the option to meet as late as 9 p.m. likely enhanced participation. In addition, the automated e-mail reminders and personal phone calls likely were helpful strategies.

Similar to many investigations (Dunn & Gordon, 2005; Grant & Sugarman, 2004; Lemmens & Elliott, 2001), incentives probably assisted in the recruitment and retention efforts. Specific incentives were derived from alliance-building and input from members of the Greek community. Thus, both individual and chapter-level incentives were created. The strategy of learning what incentives are most rewarding and valuable to the specific study population may prove useful for future investigators as they work to strengthen their participant recruitment and retention to clinical trials.

Limitations

A number of limitations are to be noted. Foremost among these is that the population of traditional-aged undergraduate students represents a specific demographic in regard to developmental stage of life. As well, using fraternity and sorority chapters in a group design may limit generalizability, as many population groups of interest may not be as amenable to working toward helping their existing, intact social organizations. In addition, generalizability may be limited due to the majority of study participants' relatively low level

of smoking, and recruitment and retention of lower level smokers may differ from that of higher level smokers. Furthermore, the collaborative approach described in this investigation is time-intensive; future researchers may seek more time- and cost-efficient methods of partnering with the population of interest.

Additionally, it is likely that the intervention itself contributed to successful retention of participants. MI is by design an empathic, non-confrontational intervention and does not attempt to push individuals through argument or persuasion to change behaviors they are not ready to change. This is particularly relevant to retention in this trial as individuals were recruited regardless of motivation to change their behaviors.

Finally, the descriptive nature of this study creates a limitation in that none of the strategies employed to enhance recruitment and retention were directly tested. Thus, it is premature to conclude with certainty that these tactics directly contributed to recruitment and retention success. Nor can we evaluate if one strategy was better than another; for example, it is unclear if flexibility and convenience in scheduling intervention sessions was more beneficial to retention than email reminders. An important direction for future researchers would be to investigate further which strategies are incrementally most effective.

Conclusion

Indicators in the current study support the conclusion that the extensive range of recruitment and retention strategies was effective and did not differentially affect participants. These strategies have been organized and described with the aim of enhancing future investigators' efforts to study similar samples and/or conduct similar studies. The intention to work from *within* the population of interest and to collaborate with the study participants was the overall objective. Although the particular methods of recruitment and retention may vary by population and/or study content, the fundamental principles are likely to be applicable in other settings.

Acknowledgments

The project described was supported by Award Number R01CA107191 from the National Cancer Institute. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute or the National Institutes of Health.

References

- An LC, Hennrikus DJ, Perry CL, Lein EB, Klatt C, Farley DM, et al. Feasibility of internet health screening to recruit college students to an online smoking cessation intervention. *Nicotine & Tobacco Research*. 2007; 9(Suppl. 1):S11–S18. [PubMed: 17365722]
- Arnett JJ. Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*. 2000; 55:469–480. [PubMed: 10842426]
- Bost ML. A descriptive study of barriers to enrollment in a collegiate health assessment program. *Journal of Community Health Nursing*. 2005; 22:15–22. [PubMed: 15695193]
- Catley D, Harris KJ, Mayo MS, Hall S, Okuyemi KS, Boardman T, et al. Adherence to principles of Motivational Interviewing and client within-session behavior. *Behavioural and Cognitive Psychotherapy*. 2006; 34:43–56.
- Center for the Study of the College Fraternity. 2006 AFA/CSCF fraternity/sorority advising profession and community status survey, Executive Summary. Author; Bloomington, IN: 2006.
- Centers for Disease Control and Prevention. [September 8, 2009] CDC/ATSDR Committee on Community Engagement.. Principles of community engagement. 1997. from <http://www.cdc.gov/phppo/pce/>

- Davies J, McCrae BP, Frank J, Dochnahl A, Pickering T, Harrison B, et al. Identifying male college students' perceived health needs, barriers to seeking help, and recommendations to help men adopt healthier lifestyles. *Journal of American College Health*. 2000; 48:259–267. [PubMed: 10863869]
- Dunn L, Gordon N. Improving informed consent and enhancing recruitment for research by understanding economic behavior. *JAMA*. 2005; 293:609–612. [PubMed: 15687316]
- Fiore, MC.; Jaen, CR.; Baker, TB. Treating tobacco use and dependence: 2008 update. U. S. Department of Health and Human Services. Public Health Service; Rockville, MD: 2008. Clinical Practice Guideline..
- Given BA, Keilman LJ, Collins C, Given CW. Strategies to minimize attrition in longitudinal studies. *Nursing Research*. 1990; 39:184–186. [PubMed: 2342908]
- Grady C. Payment of clinical research participants. *The Journal of Clinical Investigation*. 2005; 115:1681–1687. [PubMed: 16007244]
- Graham, JW.; Hofer, SM.; Donaldson, SI.; MacKinnon, DP.; Schafer, JL. Analysis with missing data in prevention research.. In: Bryant, K.; Windle, M.; West, S., editors. *The science of prevention: Methodological advances from alcohol and substance abuse research*. American Psychological Association; Washington, DC: 1997. p. 325–366.
- Grant RW, Sugarman J. Ethics in human subjects research: Do incentives matter? *Journal of Medicine and Philosophy*. 2004; 29:717–738. [PubMed: 15590518]
- Hall SM, Delucchi KL, Velicer WF, Kahler CW, Ranger-Moore J, Hedeker D, et al. Statistical analysis of randomized trials in tobacco treatment: Longitudinal designs with dichotomous outcome. *Nicotine & Tobacco Research*. 2001; 3:193–202. [PubMed: 11506764]
- Harris, KJ. Current research in smoking among college students; Grand Rounds presentation to University of Missouri Student Health Center Health Care Providers; University of Missouri-Columbia, Columbia, MO. 2002, April;
- Harris KJ, Ahluwalia JS, Catley D, Okuyemi KS, Mayo MS, Resnicow K. Successful recruitment of minorities into clinical trials: The Kick It at Swope project. *Nicotine & Tobacco Research*. 2003; 5:575–584. [PubMed: 12959796]
- Harris KJ, Golbeck AL, Cronk N, Catley D, Conway K, Williams K. Timeline follow-back versus global self-reports of tobacco smoking: A comparison of findings with infrequent smokers. *Psychology of Addictive Behaviors*. 2009; 23:368–372. [PubMed: 19586155]
- Harris, KJ.; Grobe, J.; McCarter, KS.; Nazir, N.; Gerkovich, M.; Choi, WS., et al. Smoking while in college: Baseline analysis from a longitudinal survey; Eighth Annual Scientific Sessions for the Society for Research on Nicotine and Tobacco; Savannah, GA. 2002, April;
- Hough RL, Tarke H, Renker V, Shields P, Glatstein J. Recruitment and retention of homeless mentally ill participants in research. *Journal of Consulting & Clinical Psychology*. 1996; 64:881–891. [PubMed: 8916615]
- Ivaz S, Brennan S, Dean S, Hay S, Hay P, Kerry S, et al. Lessons learned from recruiting young female students to a randomized controlled trial of chlamydia screening. *Family Practice*. 2006; 23:188–191. [PubMed: 16452128]
- Kealey KA, Ludman EJ, Mann SL, Marek PM, Phares MM, Riggs KR, et al. Overcoming barriers to recruitment and retention in adolescent smoking cessation. *Nicotine & Tobacco Research*. 2007; 9:257–270. [PubMed: 17365757]
- Klatt C, Berg CJ, Thomas JI, Ehlinger E, Ahluwalia JS, An LC. The role of peer e-mail support as part of a college smoking-cessation website. *American Journal of Preventive Medicine*. 2008; 35(6 Suppl.):S471–S478. [PubMed: 19012841]
- Lemmens T, Elliott C. Justice for the professional guinea pig. *American Journal of Bioethics*. 2001; 1(2):51–53. [PubMed: 11951892]
- Levinson AH, Campo S, Gascoigne J, Jolly O, Zakharyan A, Tran V. Smoking, but not smokers: Identity among college students who smoke cigarettes. *Nicotine & Tobacco Research*. 2007; 9:845–852. [PubMed: 17654297]
- McCabe SE, Schulenberg JE, Johnston LD, O'Malley PM, Bachman JG, Kloska DD. Selection and socialization effects of fraternities and sororities on US college student substance use: A multi-cohort national longitudinal study. *Addiction*. 2005; 100:512–524. [PubMed: 15784066]

- McDonald PW. Population-based recruitment for quit-smoking programs: An analytic review of communication variables. *Preventive Medicine*. 1999; 28:545–557. [PubMed: 10404552]
- Miller, WR.; Rollnick, S. *Motivational interviewing: Preparing people for change*. 2nd ed.. Guilford; New York: 2002.
- Morrell HER, Cohen LM, Bacchi D, West J. Predictors of smoking and smokeless tobacco use in college students: A preliminary study using web-based survey methodology. *Journal of American College Health*. 2005; 54:108–115. [PubMed: 16255323]
- Motzer S, Moseley JR, Lewis FM. Recruitment and retention of families in clinical trials with longitudinal designs. *Western Journal of Nursing Research*. 1997; 19:314–333. [PubMed: 9170990]
- Nath Simmons V, Brandon TH. Secondary smoking prevention in a university setting: A randomized comparison of an experiential, theory-based intervention and a standard didactic intervention for increasing cessation motivation. *Health Psychology*. 2007; 26:268–277. [PubMed: 17500613]
- Northouse LL, Rosset T, Phillips L, Mood D, Schafenacker A, Kershaw T. Research with families facing cancer: The challenges of accrual and retention. *Research in Nursing & Health*. 2006; 29:199–211. [PubMed: 16676337]
- O'Fallon LR, Deary A. Community-based participatory research as a tool to advance environmental health sciences. *Environmental Health Perspectives*. 2002; 110:155–159. [PubMed: 11929724]
- Okuyemi KS, Cox LS, Nollen NL, Snow TM, Kaur H, Choi W, et al. Baseline characteristics and recruitment strategies in a randomized clinical trial of African-American light smokers. *American Journal of Health Promotion*. 2007; 21:183–191. [PubMed: 17233236]
- Prokhorov AV, Yost T, Mullin-Jones M, de Moor C, Ford KH, Marani S, et al. “Look at your health”: Outcomes associated with a computer-assisted smoking cessation counseling intervention for community college students. *Addictive Behaviors*. 2008; 33:757–771. [PubMed: 18280668]
- SAS Institute, Inc.. *Base SAS 9.1.3 procedures guide*. 2nd ed.. Vol. 1, 2, 3, and 4. Author; Cary, NC: 2006.
- Sapienza JN, Corbie-Smith G, Keim S, Fleischman AR. Community engagement in epidemiological research. *Ambulatory Pediatrics*. 2007; 7:247–252. [PubMed: 17512886]
- Sears S, Stanton AL, Kwan L, Krupnick JL, Rowland JH, Meyerowitz BE, et al. Recruitment and retention challenges in breast cancer survivorship research: Results from a multisite, randomized intervention trial in women with early stage breast cancer. *Cancer Epidemiology, Biomarkers & Prevention*. 2003; 12:1087–1090.
- Sobell MB, Sobell LC, Klajner F, Pavan D, Basian E. The reliability of a timeline method for assessing normal drinker college students' recent drinking history: utility for alcohol research. *Addictive Behavior*. 1986; 11:149–161.
- SRNT Subcommittee on Biochemical Verification. Biochemical verification of tobacco use and cessation. *Nicotine & Tobacco Research*. 2002; 4:149–159. [PubMed: 12028847]
- Steinberg L. Risk taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science*. 2007; 16:55–59.
- Swanson GM, Ward AJ. Recruiting minorities into clinical trials: Toward a participant-friendly system. *Journal of the National Cancer Institute*. 1995; 87:1747–1759. [PubMed: 7473831]
- Varvel SJ, Cronk NJ, Harris KJ, Scott AB. Adaptation of a lay health advisor model as a recruitment and retention strategy in a clinical trial of college student smokers. *Health Promotion Practice*. (in press).
- Villarruel AM, Jemmott LS, Jemmott JB, Eakin BL. Recruitment and retention of Latino adolescents to a research study: Lessons learned from a randomized clinical trial. *Journal for Specialists in Pediatric Nursing*. 2006; 11:244–250. [PubMed: 16999746]
- Waters K, Harris K, Hall S, Nazir N, Waigandt A. Characteristics of social smoking among college students. *Journal of American College Health*. 2006; 55:133–139. [PubMed: 17175899]
- Wetter DW, Kenford SL, Welsch SK, Smith SS, Fouladi RT, Fiore MC, et al. Prevalence and predictors of transitions in smoking behavior among college students. *Health Psychology*. 2004; 23:168–177. [PubMed: 15008662]

Table 1

Baseline sample characteristics

Total Sample (N = 452)	Percent
<u>Gender</u>	
Male	55
Female	45
<u>Condition</u>	
Treatment	54
Comparison	46
<u>Age</u>	
18	21
19	31
20	29
21+	19
<u>Average Daily Fruit & Vegetable Consumption</u>	
0-1	26
2-4	62
5+	12

	<u>Mean (SD)</u>	<u>Median</u>	<u>Range</u>
<u>Total number of cigarettes smoked in past 30 days</u>	62.87 (109.06)	18.00	(0-700)
<u>Motivation to Quit Smoking (0-10)</u>	5.46 (2.93)	5.00	(0-10)
<u>Motivation to Increase Fruit & Vegetable Consumption (0-10)</u>	6.56 (2.63)	7.00	(0-10)

Table 2

Session attendance for total sample and conditions

<u>Number of Sessions Attended</u>	<u>Total <i>n</i> (%)^a</u>	<u>Treatment <i>n</i> (%)^b</u>	<u>Comparison <i>n</i> (%)^c</u>
0	51 (11)	24 (10)	27 (13)
1	39 (9)	19 (8)	20 (10)
2	33 (7)	18 (7)	15 (7)
3	48 (11)	30 (12)	18 (9)
4	281 (62)	154 (63)	127 (61)

^a percent of individuals who completed baseline, were enrolled in the study, and attended this number of sessions

^b percent of individuals who completed baseline, were enrolled in the study, assigned to the treatment condition, and attended this number of sessions

^c percent of individuals who completed baseline, were enrolled in the study, assigned to the comparison condition, and attended this number of sessions.

Table 3

Tests of associations with retention in the trial

Variable of Association^a	<i>F</i> (1, 384)	<i>p</i>-value
Gender (0 = Male, 1 = Female)	0.09	0.76
Age Group	0.69	0.41
Cigarettes Smoked in Past 30 Days	0.84	0.36
Average Daily Fruit and Vegetable Consumption	0.05	0.83
Motivation to Quit	1.55	0.21
Motivation to Increase	1.38	0.24
Condition (0 = smoking treatment, 1 = comparison)	0.37	0.54
	<i>F</i> (22, 384)	
Health Consultant Assigned ^b	0.88	0.63

Condition = condition assigned (treatment vs. comparison); Motivation to Increase = Motivation to increase fruit and vegetable consumption to at least five servings per day; Motivation to Quit = Motivation to quit smoking.

^a Analyses are based on 441 (98% of total) cases where at least one variable had a non-missing value

^b Because assigned Health Consultant was a nominal variable with 23 levels, with no natural choice for base comparison level, and was not significantly associated with retention, individual parameter estimates are not shown for ease of presentation